

**Walnut and Grayson Creeks Levee Rehabilitation
At CCCSD Treatment Plant
Contra Costa County Flood Control and Water Conservation District
Technical Justification of Project**

Project Physical Benefits

As noted in the Work Plan, the CCCSD wastewater treatment plant is a critical piece of regional infrastructure serving an urban population of 450,000 residents in a number of cities and unincorporated areas. Improving flood protection for the treatment plant will ensure its continued operation in the event that a low frequency storm occurs in the Walnut and Grayson Creeks watershed. Primary benefits of this project include:

- Protection of a sewage treatment plant serving 450,000 residents in central Contra Costa County.
- Protection of an overall plant site of 254 acres, incorporating 36 facility buildings with over 353,000 square feet of floor space. Table 1 contains a listing of the buildings, building replacement costs, and floor space at the treatment plant.
- Protection of \$146,380,000 worth of treatment plant assets that, due to their location within the treatment plant, are at risk to inundation. Att7_SWF_TechJust_2of3 contains a tabulation of the facility equipment provided by CCCSD that would be inundated and have to be replaced in the event the levees were overtopped.

Secondary benefits include:

- Protection of a wastewater recycling facility that produces over 187,000,000 gallons of treated effluent a year for local businesses. A listing of the CCCSD's recycled water customers is provided in Table 2. If this source of recycled water was terminated due to a plant shutdown, these businesses would have to use treated potable water as an alternative and at much greater cost.
- Protection of a regional household hazardous waste collection facility located at the treatment plant.

The current levee protecting the treatment plant only provides 30-year flood protection with freeboard. This has been documented through extensive modeling of the Walnut and Grayson Creek channels by the District and the US Army Corps of Engineers (USACE). The District used the industry-standard HEC-RAS model to determine the water surface elevations in Walnut and Grayson Creeks, and compared them with the surveyed levee heights. The Walnut and Grayson Creeks model is an unsteady flow model, and it uses side flow weirs at various levee locations to quantify the volume and timing of any levee overtopping, as well as to simulate the effect of overtopping on the hydrograph.

This model was originally constructed by USACE hydraulics engineers at the Sacramento District in support of the Lower Walnut Creek General Reevaluation project. Watershed-wide hydrology was last updated in 2008. The model uses topography and bathymetry collected by the District to determine the creek conveyance geometry. Existing levee cross sections and elevations were determined by District survey crews in 2007. Additional survey work is planned as part of the design effort in Task 4.2 of the Work Plan. Based on the modeling results, water surfaces with freeboard for a 30-year recurrence interval at the top of the existing levee put the treatment plant at-risk to flooding and inundation.

The CCCSD treatment plant, like many other treatment plants, has a majority of its operational functions occurring below grade in tunnels and vaults. With an eye toward protecting these systems from inundation, CCCSD has completed a detailed survey of vulnerable equipment and facilities. A partial list of the systems that would be flood damaged includes:

- Heat pumps
- Elevators
- Automated valves and controls
- Security and video monitoring systems
- Wastewater, sludge, grit, and chemical pumps and controls
- Electrical transformers, transfer switches, and starters
- Emergency lighting
- Exhaust fans and HVAC systems
- Chemical injection, monitoring, metering, and control equipment
- Hydrogen sulfide monitoring equipment
- Forklifts, manlifts, and shop carts
- Exhaust systems and controls
- Chemical feeders and handling systems
- Ultraviolet disinfection equipment
- Sludge and sewage grinders and screens
- Water chiller and pumping systems
- Fume scrubbers and emissions controls
- Chemical mixers
- Laboratory equipment
- Filtration systems
- Recycled water systems
- Chlorination equipment
- Plant process and effluent monitoring equipment
- Steam boilers and boiler treatment systems
- Cranes
- Electrical, instrumentation, welding, wood, machine, and mechanical shops
- Telephone and communications systems
- Solids dryers and furnaces
- Fuel oil systems
- Fire sprinkler system controls

CCCSD's comprehensive inventory of treatment plant equipment and facilities subject to flood damage is provided in Att7_SWF_TechJust_2of3. The methodology used to compile the inventory it is provided in Att7_SWF_TechJust_2of3. Collectively, this equipment list will be referred to as the treatment plant assets. Att7_SWF_TechJust_2of3 also includes equipment location and cost estimates for replacement of each of the approximately 2800 items on the list. As previously noted, **protecting the operability of the treatment plant assets is the primary physical benefit of the proposed project.**

Because most of the treatment plant's critical electrical, mechanical, and control systems are located at or below grade, the treatment plant is especially vulnerable to flood damage. Even relatively minor inundation of the site would quickly fill the below-grade tunnels and vaults of the treatment plant, and would damage or destroy all of the equipment listed in Att7_SWF_TechJust_2of3, completely shutting down the entire facility. In addition to the high \$146,380,000 cost for replacing the equipment, there would be a minimum of six-month delay for acquisition and installation of replacements due to the specialized and intricate nature of treatment plant systems.

Central Contra Costa County does not have an alternative wastewater treatment system and inundation of the CCCSD site would take the treatment plant off-line for months, creating an

extensive environmental and social crisis. A non-functional treatment plant would force drastic water use reductions within CCCSD's service area and would discharge up to 50 million gallons a day of raw and untreated sewage directly into the adjacent Walnut Creek and then into the San Francisco Bay, endangering wildlife, fisheries, recreation, and commerce throughout the region.

This project will significantly reduce the uncertainty of treatment plant operation by increasing site flood protection from a 30-year recurrence level to a greater than 500-year recurrence level. No other facilities will need to be constructed to implement this improvement and this is a stand-alone project.

There appear to be no appreciable adverse physical effects to raising the levees other than noise and dust generated by fill or sheetpile driving operations. As the levees already exist, all construction would occur in what are currently levee access roads and treatment plant perimeter patrol roads, minimizing impact to local ecosystems. These impacts will be analyzed and mitigation measures identified in the project's CEQA document, which will be prepared in Task 2.1, CEQA, of the Work Plan.

Annual Project Physical Benefits

The primary physical benefit for the project is improved flood protection for the CCCSD treatment plant. Table 3, below, provides the annual project physical benefits.

Table 3 – Annual Project Physical Benefits			
Project Name: Walnut and Grayson Creeks Levee Rehabilitation at CCCSD Treatment Plant			
Type of Benefit Claimed: Improved Flood Protection for Wastewater Treatment Plant			
Measure of Benefit Claimed (Name of Units): Level of Flood Protection Provided In Recurrence Interval (e.g. 30-year level of protection, 100-year level of protection, etc.)			
Additional Information About this Measure:			
(a)	(b)	(c)	(d)
Year	Physical Benefits		
	Without Project	With Project	Change Resulting from Project (b) – (c)
2016 to 2066	30-year level of protection to treatment plant assets	Greater than 500-year level of protection to treatment plant assets	Increase of 470-year level of protection to treatment plant assets
Comments: Assumes a 50-year project life and that the project is constructed in 2016.			

G:\fldctl\Watershed Planning - Engineering\Zone 3B - Walnut San Ramon\Lower WC\Stormwater Flood Management Grant Application\Att7_SWF_TechJust_1of1.docx